Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course!

TEMPERATURE

- ☑ Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- ☑ Wire: Thermocouple, RTD & Thermistor
- ☑ Calibrators & Ice Point References
- ☑ Recorders, Controllers & Process Monitors
- ☑ Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- ☑ Transducers & Strain Gauges
- ☑ Load Cells & Pressure Gauges
- ☑ Displacement Transducers
- ☑ Instrumentation & Accessories

FLOW/LEVEL

- ☑ Rotameters, Gas Mass Flowmeters & Flow Computers
- ☑ Air Velocity Indicators
- ☑ Turbine / Paddlesheel Systems
- ☑ Totalizers & Batch Controllers

pH/CONDUCTIVITY

- ☑ pH Electrodes, Testers & Accessories
- ☑ Benchtop/Laboratory Meters
- ☑ Controllers, Calibrators, Simulators & Pumps
- ☑ Industrial pH & Conductivity Equipment

DATA ACQUISITION

- ☑ Data Acquisition & Engineering Software
- ☑ Communications-Based Acquisition Systems
- ☑ Plug-in Cards for Apple, IBM & Compatibles
- ☑ Datalogging Systems
- ☑ Recorders, Printers & Plotters

HEATERS

- ☑ Heating Cable
- ☑ Cartridge & Strip Heaters
- ☑ Immersion & Band Heaters
- ☑ Flexible Heaters
- ☑ Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- ☑ Metering & Control Instrumentation
- ☑ Refractometers
- ☑ Pumps & Tubing
- ☑ Air, Soil & Water Monitors
- ☑ Industrial Water & Wastewater Treatment
- ☑ pH, Conductivity & Dissolved Oxygen Instruments

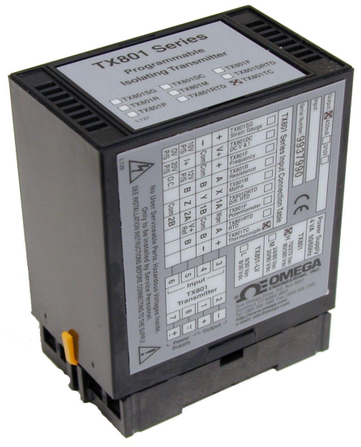
M-3798-0302

CE

User's Guide

OMEGA® ENGINEERING, INC.

An OMEGA Technologies Company



http://www.omega.com
e-mail: info@omega.com

TX801D RTD SERIES PROGRAMMABLE ISOLATING DIFFERENTIAL RTDTRANSMITTER

omega.com™
ΩOMEGA

OMEGAnet℠ On-Line Service http://www.omega.com	Internet e-mail info@omega.com

Servicing North America:

USA: One Omega Drive, Box 4047
ISO 9001 Certified Stamford, CT 06907-0047
Tel: (203) 359-1660 FAX: (203) 359-7700
e-mail: info@omega.com

Canada: 976 Bergar
Laval (Quebec) H7L 5A1
Tel: (514) 856-6928 FAX: (514) 856-6886
e-mail: canada@omega.com

For immediate technical or application assistance:

USA and Canada: Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA℠
Customer Service: 1-800-622-2378 / 1-800-622-BEST℠
Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN℠
TELEX: 996404 EASYLINK: 62968934 CABLE: OMEGA

Mexico and Latin America: Tel: (95) 800-TC-OMEGA℠ FAX: (95) 203-359-7807
En Espanol: (203) 359-7803 e-mail: espanol@omega.com

Servicing Europe:

Benelux: Postbus 8034, 1180 LA Amstelveen, The Netherlands
Tel: (31) 20 6418405 FAX: (31) 20 6434643
Toll Free in Benelux: 06 0993344
e-mail: nl@omega.com

Czech Republic: ul. Rude armady 1868, 733 01 Karvina-Hranice, Czech Republic
Tel: 420 (69) 6311627 FAX: 420 (69) 6311114
e-mail: czech@omega.com

France: 9, rue Denis Papin, 78190 Trappes
Tel: (33) 130-621-400 FAX: (33) 130-699-120
Toll Free in France: 0800-4-06342
e-mail: france@omega.com

Germany/Austria: Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
Tel: 49 (07056) 3017 FAX: 49 (07056) 8540
Toll Free in Germany: 0130 11 21 66
e-mail: germany@omega.com

United Kingdom: 25 Swannington Road, P.O. Box 7, Omega Drive,
ISO 9001 Certified Broughton Astley, Leicestershire, Irlam, Manchester,
LE9 6TU, England M44 5EX, England
Tel: 44 (1455) 285520 Tel: 44 (161) 777-6611
FAX: 44 (1455) 283912 FAX: 44 (161) 777-6622
Toll Free in England: 0800-488-488
e-mail: uk@omega.com

It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.
WARNING: These products are not designed for use in, and should not be used for, patient connected applications.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

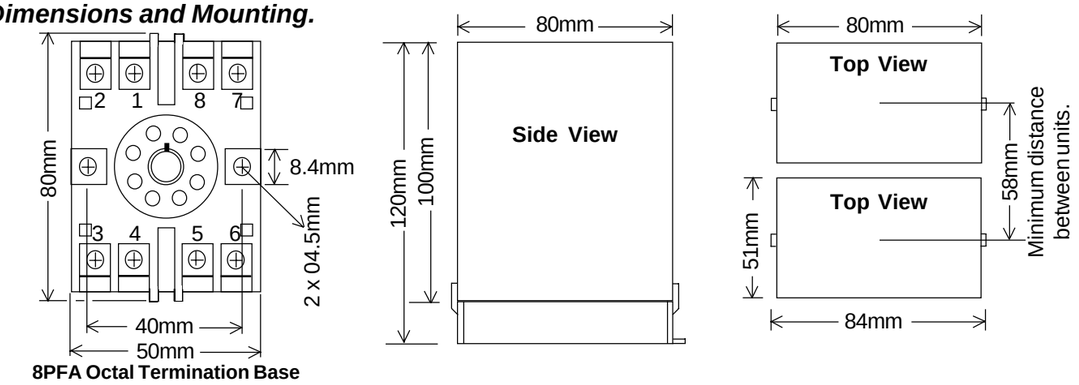
Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.
The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:
1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:
1. P.O. number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.
OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

Dimensions and Mounting.



The Proper Installation & Maintenance

MOUNTING.

(1) Mount in a clean environment in an electrical cabinet on 35mm, symetrical, mounting rail.
(2) Do not subject to vibration or excess temperature or humidity variations.
(3) Avoid mounting in cabinets with power control equipment.
(4) To maintain compliance with the EMC Directives the TX801D RTD is to be mounted in a fully enclosed steel cabinet. The cabinet must be properly earthed, with appropriate input / output entry points, filtering and cabling.

WIRING.

(1) A readily accessible disconnect device and overcurrent device must be incorporated in the the power supply wiring.
(2) All cables should be good quality overall screened INSTRUMENTATION CABLE with the screen earthed at one end only.
(3) Signal cables should be laid a minimum distance of 300mm from any power cables.
(4) For 2 wire current loops and 2 wire RTDs, Austral Standard Cables B5102ES is recommended. For three wire transmitters and 3 wire RTDs Austral Standard Cables B5103ES is recommended.
(5) For differential 2-wire RTD measurement it is important to use identical cables and keep them the same length, so errors due to cable length are kept minimal.
(6) It is recommended that you do not ground current loops and use power supplies with ungrounded outputs.
(7) Lightning arrestors should be used when there is a danger from this source.
(8) Refer to diagrams for connection information.

RTD'S.

(1) Avoid locating the RTD where it will be in a direct flame.
(2) Locate it where the average temperature will be measured. It should be representative of the mass.
(3) Immerse the RTD so that the measuring point is entirely in the temperature to be measured; 9 to 10 times the diameter of the protection tube is recommended. Heat that is conducted away from the measuring point causes an error in reading.

COMMISSIONING.

(1) Once all the above conditions have been carried out and the wiring checked apply power and allow five minutes for it to stabilize.
(2) Due to differences in cable resistance in the RTD legs or errors within the RTD itself a small Zero error may occur (usually less than 1C). To remove this error use two calibration standard RTDs at the same immersion depths and adjust the Zero trimpot in the top of the enclosure with a small screwdriver, until the two levels agree. (Clockwise to increase the output reading and anti-clockwise to decrease the output reading.)

MAINTENANCE.

(1) Check RTDs in place - with the calibration RTDs at the same immersion depths.
(2) Do it regularly - at least once every 6 months.
(3) Replace defective protection tubes - even if they look good they may not be fluid or gas tight.
(4) Check cables entering the RTD sensor heads.

TX801D RTD Programmable Programmable Isolating Differential RTD Transmiter

Programmable, Isolating, 3 Wire RTD Input to DC Current or DC Voltage Output Transmitter.

Features.

- **Field Programmable Input and Output Ranges.**
- **Bi-Polar Input and Output Ranges.**
- **Isolated Input to Output 1.6kV.**
- **High Accuracy & Linearity to 0.1%.**
- **Linear With Temperature.**
- **Universal AC/DC Power Supply.**
- **Compact DIN Rail Mount Enclosure.**
- **Available Standard or Special Calibration.**

Specifications.

RTD Input		Pt100 DIN (2 Wire Type) Standard.
		Sensor Current = 0.8mA Typical.
		Field Programmable Zero From -200C(-400F) to 200C(400F).
		Field Programmable Span From 20C(40F) to 600C(1200F).
		Other Types of RTD Available:
		JIS Pt100, Pt250, Pt500, Pt1000, CU10, CU100, Ni100 or Specified.
Output	- Voltage	Field Programmable From 500mVdc to ±12Vdc.
		Maximum Output Drive = 10mA.
	- Current	Field Programmable From 1mAdc to ±20mAdc.
		Maximum Output Drive = 10Vdc. (500Ω @ 20mA.)
Universal P/S	-Standard High (H)	70~270Vac and 80~380Vdc; 50/60Hz; 4VA.
	-Standard Mid (M)	24~80Vac and 20~90Vdc; 50/60Hz; 4VA.
	-Low Voltage (L)	8~30Vac and 8~30Vdc; 50/60Hz; 4VA.
	-Circuit Sensitivity	<±0.001%/V FSO Typical.
Accurate to		<±0.1% FSO Typical.
Linearity & Repeatability		<±0.1% FSO Typical.
Ambient Drift		<±0.01%/C FSO Typical.
Noise Immunity		125dB CMRR Average. (1.6kV Peak Limit.)
R.F. Immunity		<1% Effect FSO Typical.
Isolation Voltage		1.6kVac/dc Input to Output for 60 sec.
Response Time		200msec Typical. (10 to 90% 50msec Typical.)
Operating Temperature		0~70C.
Storage Temperature		-20~80C.
Operating Humidity		90% RH Max. Non-Condensing.
Construction		Socket Plug-In Type with Barrier Terminals.

Note 1. Specifications based on Standard Calibration Unit, with RTD 2 at 0C, unless otherwise specified.
Note 2. Due to ongoing research and development designs, specifications, and documentation are subject to change without notification. No liability will be accepted for errors, omissions or amendments to this specification.

Quality Assurance Programme.

The modern technology and strict procedures of the ISO9001 Quality Assurance Programme applied during design, development, production and final inspection grant long term reliability of the instrument.

Input Programming.

Always set **OUTPUT range first**, then INPUT range.
If the Input range is not listed in the programming table, use the following formulae to work out the Zero and Span DIP switch settings for gain.

Deg C Span Gain = $\frac{1200}{\text{deg C High - deg C Low}}$ **Deg F Spain Gain =** $\frac{2400}{\text{deg F High - deg F Low}}$

Deg C Zero Gain = $\frac{\text{deg C Low}}{5}$ **Deg F Zero Gain =** $\frac{\text{deg F Low}}{10}$

If Zero is: 1/ Positive, put S5-1 OFF. 2/ Negative, put S5-1 ON.

Gain Value	1	2	4	8	16	32
DIP Switch No.	1	2	3	4	5	6

So if a gain value of 28 is required, put DIP switch No's 3, 4, 5 OFF (ie, gains of 4 + 8 + 16 = 28) and all the other DIP switches ON.
DIP switches and trimpots are accessed by removing the small rectangular lid on the top of the PI-N enclosure

Note: (a) Enter the Zero or Span gain value into the appropriate Zero or Span DIP switch.
(b) If the *ZERO GAIN* exceeds **63**, then the input range must be factory calibrated.

Input Range Programming Table.

Notes: 1/ Switch status 1 = ON, 0 = OFF, X = DON'T CARE.
2/ Input ranges with '*' beside them require more adjustment by the Span trimpot.

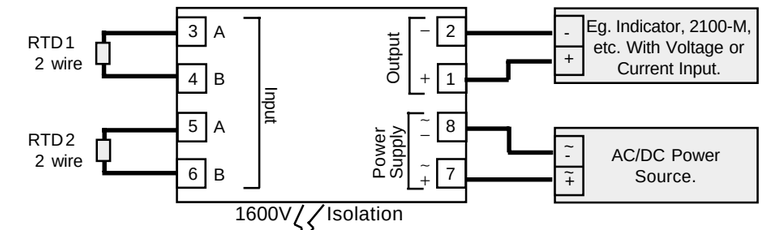
Input Range C Put S5-2 OFF	Input Range F Put S5-2 ON	S3-Span 1	2	3	4	5	6	S4-Zero 1	2	3	4	5	6	S5-Function 1	2	3	4
0~20C	0~40F	1	1	0	0	0	0	1	1	1	1	1	1	X	SET TO '0' FOR FAHRENHEIT.		
0~25C	0~50F	1	1	1	1	0	0	1	1	1	1	1	1	X			
0~30C	0~60F	1	1	1	0	1	0	1	1	1	1	1	1	X			
0~40C	0~80F	1	0	0	0	0	1	1	1	1	1	1	1	X			
0~50C	0~100F	1	1	1	0	0	1	1	1	1	1	1	1	X			
0~60C	0~120F	1	1	0	1	0	1	1	1	1	1	1	1	X			
0~70C *	0~140F *	0	1	1	1	0	1	1	1	1	1	1	1	X			
0~75C	0~150F	1	1	1	1	0	1	1	1	1	1	1	1	X			
0~80C	0~160F	0	0	0	0	1	1	1	1	1	1	1	1	X			
0~90C	0~180F	0	1	0	0	1	1	1	1	1	1	1	1	X			
0~100C *	0~200F *	1	1	0	0	1	1	1	1	1	1	1	1	X			
0~110C	0~220F	0	0	1	0	1	1	1	1	1	1	1	1	X			
0~120C	0~240F	1	0	1	0	1	1	1	1	1	1	1	1	X			
0~125C *	0~250F *	1	0	1	0	1	1	1	1	1	1	1	1	X			
0~150C	0~300F	1	1	1	0	1	1	1	1	1	1	1	1	X			
0~200C	0~400F	1	0	0	1	1	1	1	1	1	1	1	1	X			
0~250C *	0~500F *	0	1	0	1	1	1	1	1	1	1	1	1	X			
0~300C	0~600F	1	1	0	1	1	1	1	1	1	1	1	1	X			
0~400C	0~800F	0	0	1	1	1	1	1	1	1	1	1	1	X			
0~600C	0~1200F	1	0	1	1	1	1	1	1	1	1	1	1	X			
-10~10C	-20~20F	1	1	0	0	0	0	1	0	1	1	1	1	1	Set to '0' for UPSCALE Sensor Break. Set to '1' for DOWNSCALE Sensor Break.		
-10~20C	-20~40F	1	1	1	0	1	0	1	0	1	1	1	1	1			
-10~40C	-20~80F	1	1	1	0	0	1	1	0	1	1	1	1	1			
-20~20C	-40~40F	1	0	0	0	0	1	1	1	0	1	1	1	1			
-20~30C	-40~60F	1	1	1	0	0	1	1	1	0	1	1	1	1			
-25~25C	-50~50F	1	1	1	0	0	1	0	1	0	1	1	1	1			
-25~50C	-50~100F	1	1	1	1	0	1	0	1	0	1	1	1	1			
-30~20C	-60~40F	1	1	1	0	0	1	1	0	0	1	1	1	1			
-50~50C	-100~100F	1	1	0	0	1	1	1	0	1	0	1	1	1			
-50~100C	-100~200F	1	1	1	0	1	1	1	0	1	0	1	1	1			
-50~150C	-100~300F	1	0	0	1	1	1	1	0	1	0	1	1	1			
-100~100C	-200~200F	1	0	0	1	1	1	1	1	0	1	0	1	1			
-100~200C	-200~400F	1	1	0	1	1	1	1	1	0	1	0	1	1			
-200~200C	-400~400F	0	0	1	1	1	1	1	1	1	0	1	0	1			
-200~400C	-400~800F	1	0	1	1	1	1	1	1	1	0	1	0	1			
20~40C	40~80F	1	1	0	0	0	0	1	1	0	1	1	1	0			
50~100C	100~200F	1	1	1	0	0	1	1	0	1	0	1	1	0			
50~150C	100~300F	1	1	0	0	1	1	1	0	1	0	1	1	0			
100~200C	200~400F	1	1	0	0	1	1	1	1	0	1	0	1	0			
100~500C	200~1000F	0	0	1	1	1	1	1	1	0	1	0	1	0			

Set to '1' for UPSCALE Sensor Break. Set to '0' for DOWNSCALE Sensor Break.

Output Range Programming Table.

Notes: 1/ Switch status 1 = ON 0 = OFF.
2/ Output ranges with '*' beside them reverse the polarity of the output connections.

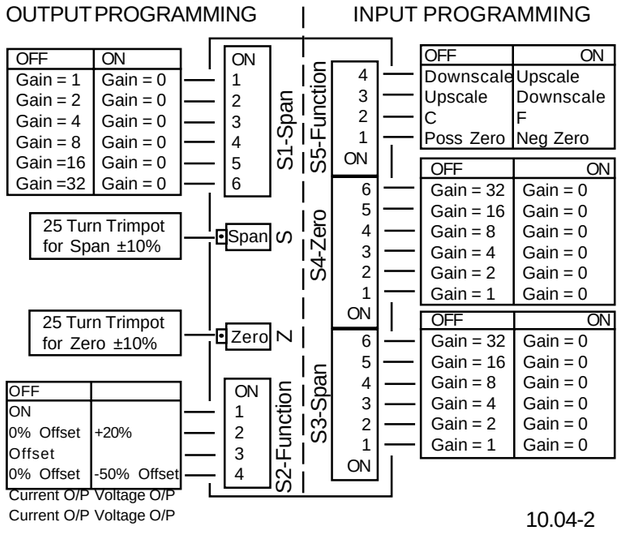
Output Range (V)	S1-SPAN 1	2	3	4	5	6	S2-Function 1	2	3	4	Output Range (I)	S1-SPAN 1	2	3	4	5	6	S2-Function 1	2	3	4
0~500mV	0	1	1	1	1	1	0	0	1	1	0~1mA	0	1	1	1	1	1	0	0	0	0
0~1V	1	0	1	1	1	1	0	0	1	1	0~2mA	1	0	1	1	1	1	0	0	0	0
0~2V	1	1	0	1	1	1	0	0	1	1	0~5mA	0	1	0	1	1	1	0	0	0	0
0~3V	1	0	0	1	1	1	0	0	1	1	0~10mA	1	0	1	0	1	1	0	0	0	0
0~4V	1	1	1	0	1	1	0	0	1	1	0~16mA	1	1	1	1	0	1	0	0	0	0
0~5V	1	0	1	0	1	1	0	0	1	1	0~20mA	1	1	0	1	0	1	0	0	0	0
0~6V	1	1	0	0	1	1	0	0	1	1	1~5mA	1	1	0	1	1	1	1	0	0	0
0~8V	1	1	1	1	0	1	0	0	1	1	2~10mA	1	1	1	0	1	1	1	0	0	0
0~10V	1	1	0	1	0	1	0	0	1	1	4~20mA	1	1	1	1	0	1	1	0	0	0
0~12V	1	1	1	0	0	1	0	0	1	1	-1~1mA	1	0	1	1	1	1	0	1	0	0
1~5V	1	1	1	0	1	1	1	0	1	1	-2~2mA	1	1	0	1	1	1	0	1	0	0
2~10V	1	1	1	1	0	1	1	0	1	1	-5~5mA	1	0	1	0	1	1	0	1	0	0
-1~1V	1	1	0	1	1	1	0	1	1	1	-10~10mA	1	1	0	1	0	1	0	1	0	0
-2~2V	1	1	1	0	1	1	0	1	1	1	-20~20mA	1	1	1	0	1	0	0	1	0	0
-5~5V	1	1	0	1	0	1	0	1	1	1	0~-10mA *	1	0	1	0	1	1	0	0	0	0
-10~10V	1	1	1	0	1	0	0	1	1	1	0~-20mA *	1	1	0	1	0	1	0	0	0	0
-12~12V	1	1	1	1	0	0	0	1	1	1											
0~-5V *	1	0	1	0	1	1	0	0	1	1											
0~-10V *	1	1	0	1	0	1	0	0	1	1											



Terminations.

Output	1	+Ve	Input	3	A, B — RTD1
	2	-Ve		4	
P/S	7	~AC/+DC		5	A, B — RTD2
	8	~AC/-DC		6	

Plan View of Adjustments.



10.04-2

H1 Power Supply Link Settings.

WARNING: High Voltages Maybe Present. Only adjust link with power disconnected.

Power Supply Link Settings	
H1	**Power Supply Voltage Range**
H	Link for High: 70~270Vac / 80~380Vdc
M	Link for Mid: 24~80Vac / 20~90Vdc

Notes:
1/ H1 is approx 4cm (1½") behind the 'S' trimpot.
2/ Exceeding voltage ranges may damage the unit.
3/ Ensure the enclosure label is correctly labelled for the link position.
4/ Adjust H1 jumper with a pair of needle nose pliers.
5/ Low Voltage Power Supply version is fixed, and has no link. This must be ordered separately.